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**WELCH**  
CONSULTING

**An Examination of Salaries  
at Los Alamos National Laboratory**

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## **Introduction.**

I, Finis Welch, and my colleagues at Welch Consulting have been asked to examine the salaries of Los Alamos National Laboratory ( LANL ) personnel as of October 2002.<sup>1</sup> The objective is to develop models for comparing average salary differences between groups defined by race or ethnicity (hereafter race) and gender and to statistically evaluate whether the pay of African Americans, American Indians/Alaskan Natives, Asians/Pacific Islanders, Hispanics, and women is commensurate with the pay of similarly situated Anglo male employees.

## **Data.**

The primary data source is an extract from the LANL Employee Information System ( EIS ), which contains historical data on salary, structural organization, job function, education, service date, race, and gender. The history includes information through October 2, 2002, after the completion of the fiscal year 2003 salary review. While we focus the study on recent salary, the database does include historical information. LANL also provided supplemental information on job performance and job content reviews (ORC). In addition, we received a supplemental education file that allows us to add graduation date to the analytical file.

When we began the analysis, information was available on the number of years of relevant experience ( YRE ) for each employee through 1996. Subsequent to our request, LANL updated the YRE data for both continuing employees and those hired after 1996.

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<sup>1</sup> We have issued a previous report: An Examination of Asian American Salaries at Los Alamos National Laboratory, March 28, 2001.

The analysis is restricted to full-time, regular employees. As such, employees in limited term, post-doctorate, co-op, graduate research assistant, or undergraduate positions, as well as part-time employees, are not considered.<sup>2</sup>

### **Statistical Significance.**

When conducting salary studies for firms, we typically rely on the standard established by the Supreme Court in *Hazelwood School District v. United States*. In that case, the Court ruled that a difference of two or three standard deviations is probably statistically significant to establish an initial threshold of legal concern, and this is the standard often adopted in employment litigation. In the tables that follow, we highlight differences of two or more standard deviations. It is important to note that this is not proof of unlawful discrimination.

This is true for at least three major reasons. First, current compensation is salary at hire and subsequent increments. Our data include individuals whose seniority extends to 49 years, and therefore represent compensation decisions that have occurred over five decades. It is my understanding that the relevant statute of limitations for a determination of unlawful discrimination is much shorter. Second, statistics serve only as an initial indicator of potentially problematic areas of concern and do not serve to determine the ultimate issue of whether discrimination has occurred. Third, the data or the model may fail to capture all factors that affect compensation. For example, the quality and applicability of an employee's education. Equally important, we have only limited information, through the YRE measure, of the quality and continuity of the prior work experience that new employees bring. Additionally, explanatory variables included in the model may be measured imprecisely or erroneously. As a further example, while ORC scores attempt to capture job content and performance, almost all employees have scores between 6 and 9. Subsequent to the analysis below we reviewed a selection of 90 personnel files for seemingly anomalous employees and in our review we found that

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<sup>2</sup> We also exclude a small number of employees whose race or gender is not recorded. However, in a few

managers often gave employees similar ORC scores, even in cases where the quality of work appeared to be considerably different. As another example, in discussing personnel files with management it was also apparent that employees coded as having the same job were often performing very different tasks. Finally, the courts admonish that analyses of compensation data must include a review of all of the surrounding facts and circumstances, and should not rely solely upon statistical results as a litmus test to find employment actions unlawful.

Conversely, an outcome that is not statistically significant does not preclude discrimination. It merely indicates the lack of statistical support for a contention that average salary differences between protected and other employees are sufficiently large to warrant concern on a class-wide basis.

As a general rule, a non-trivial estimated differential that is statistically significant should be viewed as an indicator of a problem. The problem may be the fault of differential treatment of similarly qualified and situated employees who are distinguished by race or gender, or it may be the result of incomplete or inaccurate information on which the estimate depends. It may also be the result of a model that is incorrectly specified.

### **Salary as of October 2, 2002.**

We use ordinary least-squares regression<sup>3</sup> to make average salary comparisons between groups while adjusting for potentially confounding factors. We examine salary by series: TSM, SSM, OS/GS, and TEC. Within the TSM series, employees are distinguished further by their education: Doctorate, Master s, and Bachelor s.<sup>4</sup> For each series we compare the salary of Anglo males to that of African Americans, American Indians/Alaskan Natives, Asians/Pacific Islanders, Hispanics, and females. The race

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cases gender was inferred using the given name.

<sup>3</sup> This is a common technique found in many references. See, for example, Greene, William. *Econometric Analysis*, 2<sup>nd</sup> Edition. Prentice Hall, 1993.

<sup>4</sup> The doctorate group includes J.D. degrees; the bachelor s group includes associate s degrees and None (presumably high school graduates).

comparisons include men and women. The gender comparisons include Anglo women combined with women of the other race groups. This partitioning produces thirty comparisons of race and gender groups to Anglo men.

Factors which affect compensation and are taken into account in the model include: degree and field of degree, job code, division, current ORC and the previous two values of ORC, whether the employee was a manager within the last 5 years, the job series at hire, whether on acting status, YRE, age, years since degree, time-in-grade, time-in-current series, and time-to-current series by previous series. For the records with missing values of these control variables, we treat missing as a distinct value.

Tables 1 (TSM) and 2 (SSM, OS/GS, TEC) present the results of the October 2002 salary study. The comparisons in Tables 1 and 2 provide two numbers. The first, labeled Pct. Diff. , is the average salary differential between the indicated group and Anglo men that is estimated to remain after corrections for the factors listed above. The second measures the reliability of the estimated differential and is labeled Std. Dev. By way of illustration, the first row of Table 1 presents the results for African Americans in the TSM series. African Americans with doctorates are estimated to earn approximately 0.4% less than comparable Anglo males, a difference of 0.15 standard deviations. African Americans with Master s degrees are estimated to earn about 0.1% more than similarly situated Anglo males (0.03 standard deviations) and those with bachelor s degrees are estimated to earn approximately 4.4% less (1.38 standard deviations). Where the sign on the percentage difference is negative, the protected group is estimated to earn less than comparable Anglo men. Of the three African American TSM comparisons, none is statistically significant, as they are all below two standard deviations.

Of the thirty salary comparisons, twenty-six are not statistically significant and four are, or may be, under the *Hazelwood* criterion. In particular, there are no statistically significant salary differentials between Anglo men and African Americans, American Indians/Alaskan Natives, or Asians/Pacific Islanders. The questionable cases are for comparisons involving four different sets of Hispanic and female employees.

**Table 1. TSM Annual Salary Analysis as of October 2, 2002.**

Race/ Ethnicity/ Gender <sup>1</sup>		Doctorate		Master s		Bachelor s	
		Pct. Diff.	Std. Dev.	Pct. Diff.	Std. Dev.	Pct. Diff.	Std. Dev.
(1)	African American	-0.4%	0.15	0.1%	0.03	-4.4%	1.38
(2)	American Indian / Alaskan Native	3.5%	1.71	-2.9%	1.65	-2.9%	1.18
(3)	Asian / Pacific Islander	-0.8%	1.19	0.0%	0.02	-0.8%	0.35
(4)	Hispanic	-0.3%	0.34	-0.4%	0.49	-1.6%	1.82
(5)	Female	0.7%	1.22	-1.3%	1.95	<b>-2.3%</b>	<b>2.59</b>
Employees <sup>2</sup>		1,730		953		762	

1. Estimates in rows 1 — 4 come from one regression in which gender is distinguished only for Anglo Females. The estimates in row 5 come from another regression in which Female is not distinguished by Race/Ethnicity; men in this regression are so distinguished. This has the effect of comparing each listed group to Anglo Males. Results in bold indicate statistical significance at the two standard deviation threshold.
2. See the Appendix Tables for employee counts by race and gender.

TSMs: For TSMs with bachelor s degrees, women are estimated to earn approximately 2.3% less than comparable Anglo males, which is a difference of 2.59 standard deviations.

SSMs: In the SSM series women are estimated to earn 1.8% less than similarly situated Anglo men, a shortfall of 3.48 standard deviations. Hispanics in SSM are estimated to earn 1.5% less than similarly situated Anglo men, a difference of 2.86 standard deviations.

TECs: Finally, in the TEC series Hispanics are estimated to have salaries about 1.5% less than comparable Anglo men. This difference is 4.28 standard deviations.

The salary differences that are over two standard deviations range in size between 1.5% and 2.3%.

**Table 2. SSM, OS/GS, and TEC Annual Salary Analysis as of October 2, 2002.**

Race/Ethnicity/ Gender <sup>1</sup>	SSM		OS/GS		TEC	
	Pct. Diff.	Std. Dev.	Pct. Diff.	Std. Dev.	Pct. Diff.	Std. Dev.
(1) African American	0.4%	0.18	-2.4%	0.67	-0.5%	0.30
(2) American Indian / Alaskan Native	-1.2%	0.83	-1.3%	0.58	0.2%	0.23
(3) Asian / Pacific Islander	0.2%	0.13	4.5%	1.08	1.2%	0.76
(4) Hispanic	<b>-1.5%</b>	<b>2.86</b>	-1.2%	0.61	<b>-1.5%</b>	<b>4.28</b>
(5) Female	<b>-1.8%</b>	<b>3.48</b>	-1.7%	0.82	-0.9%	1.82
Employees <sup>2</sup>	1,351		645		1,689	

1. Estimates in rows 1 — 4 come from one regression in which gender is distinguished only for Anglo Females. The estimates in row 5 come from another regression in which Female is not distinguished by Race/Ethnicity; men in this regression are so distinguished. This has the effect of comparing each listed group to Anglo Males. Results in bold indicate statistical significance at the two standard deviation threshold.
2. See the Appendix Tables for employee counts by race and gender.

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Finis Welch, Ph.D.

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Date

## Appendix Tables.

**Appendix Table 1. TSM Employee Counts in October 2, 2002 Salary Analysis.**

	Doctorate	Master s	Bachelor s
African American	6	6	7
American Indian / Alaskan Native	12	20	12
Asian / Pacific Islander	122	28	14
Hispanic	63	113	147
Anglo	1527	786	582
Female	181	193	142
Male	1549	760	620
Total	1730	953	762

**Appendix Table 2. SSM, OS/GS, and TEC Employee Counts in October 2, 2002 Salary Analysis.**

	SSM	OS/GS	TEC
African American	11	3	15
American Indian / Alaskan Native	22	19	50
Asian / Pacific Islander	18	2	15
Hispanic	552	473	863
Anglo	748	148	746
Female	765	575	335
Male	586	70	1354
Total	1351	645	1689